

Date: Tuesday, 4/17/2007 11:02:01 AM  
User: Kim Johnston

# Process Sheet

Customer : CU-DAR001 Dart Helicopters Services	Drawing Name : SA 315B LAMA SKID ASSY
Job Number : 31820	
Estimate Number : 12827	
P.O. Number : <i>NIA</i>	Part Number : D315668011
This Issue : 4/17/2007 S.O. No. : <i>NIA</i>	Drawing Number : D2904 REV <i>KB</i> <i>OK</i> <i>07.04.17</i>
Prsht Rev. : NC	Project Number : N/A
First Issue : <i>NIA</i> Type : LANDING GEAR	Drawing Revision : <i>KB</i>
Previous Run : 31817	Material : <i>NIA</i>
Written By : <i>[Signature]</i>	Due Date : 4/30/2007 Qty: 1 Um: Each
Checked & Approved By : <i>[Signature]</i> <i>07.04.17</i>	
Comment : Est Rev. A New Issue 07-04-12 JLM	

## Additional Product

Job Number:



Seq. #:	Machine Or Operation:	Description :
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1.0	DC	DOCUMENT CONTROL
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Comment: DOCUMENT CONTROL

Photocopy bluefile & type labels per PPPD315-668-011 CHG 001

*RT 07.01.20* *(1)*

2.0	D2904B	315 Skidtube Ext. (Bent)
-----	--------	--------------------------



*02914-142*



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

315 Skidtube Ext. (Bent)

Batch: *B 31826*

3.0	D2910	Doubler (Lama skid)
-----	-------	---------------------



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Doubler (Lama skid)

BATCH: *B 31827*

4.0	D2911	Doubler (Lama Skid)
-----	-------	---------------------



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Doubler (Lama Skid)

BATCH: *B 31828*

5.0	D2912	Doubler (Lama Skid)
-----	-------	---------------------



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Doubler (Lama Skid)

BATCH: *B 31829*

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

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Drawing Name: SA 315B LAMA SKID ASSY

Job Number: 31820

Part Number: D315668011

Job Number:



Seq. #:

Machine Or Operation:

Description :

6.0

LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

- 1-Drill aft cap hole as per Dwg D2904 using DT8025. ✓
- 2-Drill saddle holes (6 Deg) as per Dwg D2904 & DT8938A. ✓  
(ENSURE THAT LOCATOR RING IS SET FOR LH TUBE)
- 3-Drill Ghw Holes (3 Deg) as per Dwg D2904 using DT8938B. ✓  
(ENSURE THAT LOCATOR RING IS SET FOR LH TUBE)
- 4-Insert doublers using DT8938C (Boone Apparatus) ✓
- 5-Cleco Doublers and DT8938D in position .Transfer all 256 holes thru tube and Doublers.
- 6-Remove and Dedurr doublers and Attach to work order. ✓
- 7-C'sink Rivet holes 256 places as per Dwg D2904. ✓
- 8-Deburr if nessary. ✓

DP  
7-4-26

7.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

DP 07/04/26 @

8.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat \*\*\*\*\*Tube & Doublers \*\*\*\*\*as per QSI 005 4.1

DP 07-4-26

9.0

QC3

INSPECT POWDER COAT/CHEMICAL CONVERSION



Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION

DP 07-04-36 @

10.0

MS20601AD4W3

Rivet



Comment: Qty.: 256.0000 Each(s)/Unit Total: 256.0000 Each(s)

Rivet

BATCH:

B13282 / B13044 / B8325

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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## Process Sheet

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Drawing Name: SA 315B LAMA SKID ASSY

Job Number: 31820

Part Number: D315668011

Job Number:



Seq. #:

Machine Or Operation:

Description:

11.0

D2905

Web (Lama)



Comment: Qty.: 1.0000 Each(s)/Unit Total: 1.0000 Each(s)

Web (Lama)

Batch: B31065

12.0

LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Rivet Doublers as per Dwg D2904.

2-Open X-Bolt Spacer as per Dwg D2904  
(Do not use Cutting oil)

3-C'Sink X-bolt spacer holes to prepare for Welding.

4-Remove indexing ridge from aft end of tube.

5-Blow all chips from inside tube.

6-Bond web in place per QSI 015. Allow 12 Hrs. cure time before cutting

Pick:

Qty	Part Number	Description	Batch
A/R	Sikaflex-291	<u>1103561</u>	

Sikaflex expire date: 07-10-1

Start Time: 4:30 Date: 7-5-4

Fin Time: 2:00 Date: 07-05-07

13.0

D2909

Spacer (Lama)



Comment: Qty.: 11.0000 Each(s)/Unit Total: 11.0000 Each(s)

Spacer (Lama)

Batch: B 14091 BE 07-05-07

14.0

LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Weld crossbolt spacers D2909as per Dwg. D2904and QSI 004.

For D2579 spacers, weld one side, pass Y" drill, weld other side, pass Y" drill

A/R Aluminum Rod

4-Grind welds as per Dwg D2909 Grind

m 102421 BE 07-05-07  
DP 7-5-8

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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Drawing Name: SA 315B LAMA SKID ASSY

Job Number: 31820

Part Number: D315668011

Job Number:



Seq. #:

Machine Or Operation:

Description:

5-Drill holes for wearplates using DT8247 Open holes to 19/64", adjust stopper not to hit web-Debur

6-Cut Tube as per Dwg D2904

7-Remove Indexing Ridge on Fwd End of tube as per Dwg D2904.

8-Drill Fwd Cap holes as per Dwg D2904 Using Dt. 8025.

9-Debur.

15.0

QC5



INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

07/05/08

16.0

POWDER COATING



POWDER COATING



Comment: POWDER COATING

Powder Coat White Gloss (Ref: 4.3.5.1) as per QSI 005 4.3

M03706

07-05-09 ①

17.0

HAND FINISHING1



HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Wing Walk as per Dwg D2904 and QSI 005 4.4

Batch:

18.0

QC3



INSPECT POWDER COAT/CHEMICAL CONVERSION



Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION

FL

07/05/09 ①

19.0

D2646



Aft Cap



Comment: Qty.: 2.0000 Each(s)/Unit Total: 2.0000 Each(s)

Aft Cap

Batch:

B30119

20.0

D26483



Wearpad



Comment: Qty.: 4.0000 Each(s)/Unit Total: 4.0000 Each(s)

Wearpad

Batch:

B29777

FL

07/05/09 ①

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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Job Number: 31820

Part Number: D315668011

Job Number:



Seq. #:

Machine Or Operation:

Description :

21.0

D26483

Wearpad

★ SEE W/O CHG  
REF DSI 9172, D2648-5 REPLACED

Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

BY D2648-3

Wearpad

Batch: 629777

9/07/04.17

22.0

D265613

Wearplate



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Wearplate

Batch: B30553

23.0

D265633

Wearplate



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Wearplate

Batch: ~~B20756~~ B29452

24.0

D2907

Wearshoe (Lama)



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Wearshoe (Lama)

Batch: B14654.

25.0

ALS41032130

Insert



Comment: Qty.: 50.0000 Each(s)/Unit Total : 50.0000 Each(s)

Insert

Batch: M102475

26.0

AN960JD10L

Washer



Comment: Qty.: 54.0000 Each(s)/Unit Total : 54.0000 Each(s)

Washer

Batch: M102832

27.0

MS27039108

Screw



Comment: Qty.: 54.0000 Each(s)/Unit Total : 54.0000 Each(s)

Screw

M103641

F&amp;L

07/05/09 (1)

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes ☒ No ☐ DQA: ☒ Date: 07/03/10

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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Job Number: 31820

Part Number: D315668011

Job Number:



Seq. #:

Machine Or Operation:

Description :

28.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

1-Install inserts & wearplates as per Dwg. D2904. Use a drop of Sikaflex on insert holes before installing wearplates

A/R Sikaflex-291

Sikaflex expire date: 07/10

3-Inspect for foreign object per QSI 024

4-Install 2646 Aft & fwd Caps as per Dwg D2904 and seal with Sikaflex. Clean excess adhesive

A/R Sikaflex-291

Sikaflex expire date: 07/10

5-Wing Walk as per Dwg D2904 and QSI 005 4.4

m103707

Batch:

07/05/09

0

Feb 07/05/09

①

29.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

07/05/09

30.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Identify and pack for shipping as per PPP D315-668-011

Location:

PPP\_Rev:

Rev A

7/5/9 59

31.0

QC21

FINAL INSPECTION/W/O RELEASE



Comment: FINAL INSPECTION/W/O RELEASE

07/05/10

Job Completion



U 07.05.10

31820

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

**DART**

DESIGN <i>[Signature]</i>	DRAWN BY <i>RF</i>	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
CHECKED <i>[Signature]</i>	APPROVED <i>[Signature]</i>	DRAWING NO. DSI 9172	REV. A SHEET 1 OF 1
DATE 99.11.02		TITLE WEARPAD KITS	SCALE NTS
A	99.11.02	NEW ISSUE	

# **DART SERVICE INSTRUCTION**

TO AMEND INSTALLATION INSTRUCTIONS: D206-642

IIN-D350-636

IIN-D058-672

IIN-D315-668

Qty -105	Qty -205	Qty -107	Qty -207	Part Number	Description
X				DSI 9172-105	SURFACITE™ WEARPAD KIT
	X			DSI 9172-205	STD. TUNGSTEN CARBIDE WEARPAD KIT
		X		DSI 9172-107	SURFACITE™ WEARPAD KIT
			X	DSI 9172-207	STD. TUNGSTEN CARBIDE WEARPAD KIT
	5		7	D2648-3	WEARPAD
5		7		D2648-7	WEARPAD
20	20	28	28	MS27039-1-08	SCREWS
20	20	28	28	AN960JD10L	WASHERS

**NOTES:**

- 1) D2648-5 CAN BE REPLACED BY D2648-3.
- 2) IN THE DSI 9172 -105/ -107 KTS, THE D2648-7 WEARPADS REPLACE THE D2648-3 AND D2648-5 WEARPADS SHOWN IN THE INSTALLATION INSTRUCTIONS.
- 3) THE ABOVE KITS CAN BE INSTALLED ON DART 206 A/B, 206L/L1/L3/L4, 407, OH-58 A/A+/C, AS 350/355, AND SA 315B SKIDTUBES ACCORDING TO THE FOLLOWING TABLE:

KIT	CAN BE INSTALLED ON
DSI 9172-105 DSI 9172-205	D206-642-111/ -112 D206-642-211/ -212/ -213/ -214 D350-636-011/ -012/ -013/ -014 D315-668-011/ -012 D058-672-011/ -012/ -013/ -014
DSI 9172-107 DSI 9172-207	D206-642-311/ -312 D206-642-411/ -412

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- 4) INSTALLATION OF THE DSI 9172 -105 KIT WILL ADD 0.95 lbs (0.43 kg) TO THE WEIGHT OF THE SKIDTUBE.
- 5) INSTALLATION OF THE DSI 9172 -107 KIT WILL ADD 1.33 lbs (0.60 kg) TO THE WEIGHT OF THE SKIDTUBE.



DESIGN CP	DRAWN BY CP	DART AEROSPACE USA, INC. BELLEVUE, WA	
CHECKED [Signature]	APPROVED [Signature]	DRAWING NO. D2904	Rev. B SHEET 1 OF 3
DATE 00.06.21		TITLE SA 315B SKIDTUBE ASSEMBLY	SCALE NTS
A	99.09.09	NEW ISSUE	
B	00.06.21	CHANGED ANGLES FOR HOLES	

PARTS LIST:

Qty -041	Qty -042	Part Number	Description
X		D2904-041	LH SKIDTUBE ASSEMBLY
	X	D2904-042	RH SKIDTUBE ASSEMBLY
2	2	D2646	CAP
4	4	D2648-3	WEARPAD
1	1	D2648-5	WEARPAD
1	1	D2656-13	WEARSHOE
1	1	D2656-33	WEARSHOE
1		D2904-1	SKIDTUBE
	1	D2904-2	SKIDTUBE
1	1	D2905	WEB
1	1	D2907	WEARSHOE
11	11	D2909	CROSS BOLT SPACER
2	2	D2910	SKIDTUBE DOUBLER
2	2	D2911	SKIDTUBE DOUBLER
2	2	D2912	SKIDTUBE DOUBLER
50	50	ALS7-1032-130 or AKS4-1032-130 or ALS4-1032-130 or ALS7-1032-130	INSERT
54	54	AN980JD10L	WASHER
256	256	MS20601AD4W3	RIVET
54	54	MS27039-1-08	SCREW

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00.09.01 [Signature]

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DESIGN CP	DRAWN BY CP	DART AEROSPACE USA, INC. BELLEVUE, WA	
CHECKED [Signature]	APPROVED [Signature]	DRAWING NO. D2904	Rev. B SHEET 2 OF 3
DATE 00.06.21		TITLE SA 315B SKIDTUBE ASSEMBLY SCALE 1:20	

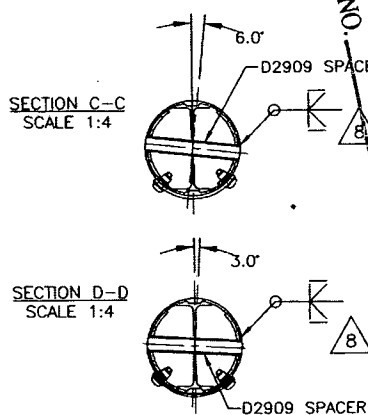
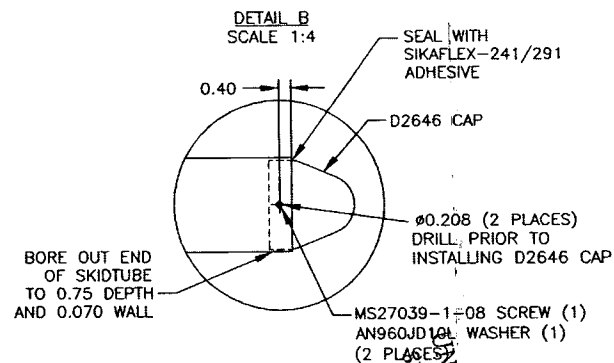
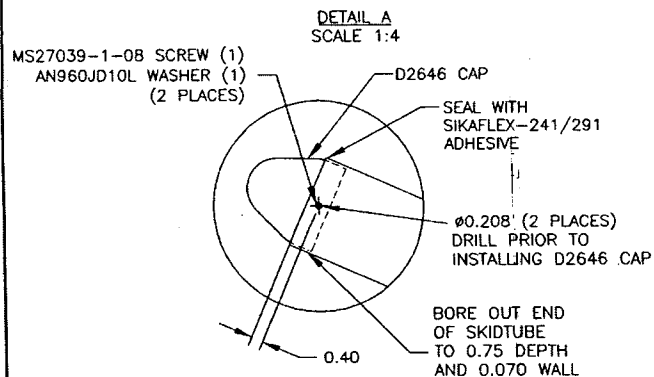
#### GENERAL NOTES:

1. TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
2. MAKE D2904-1 AND D2904-2 FROM D2914 EXTRUSION (INITIAL LENGTH = 142.0).
3. DAMAGE TOLERANCE ON BENDING:  
THERE SHOULD BE NO VISIBLE WRINKLES IN THE BEND FROM THE GROUND TO A HEIGHT OF 7 INCHES ABOVE THE GROUND. NO GOUGING IS ACCEPTABLE IN THE FLAT PORTION OF THE TUBE. GOUGES UP TO 0.020 ARE ACCEPTABLE IN THE BENT PORTION OF THE TUBE. TUBE O.D. SHOULD BE  $3.150 \pm 0.010$  IN THE FLAT PORTION OF THE TUBE. A MAXIMUM REDUCTION IN DIAMETER OF 0.150" IS ACCEPTABLE IN THE BENT PORTION OF THE TUBE.
4. ALL HOLES DRILLED ON CENTERLINES EXCEPT THOSE NOTED BY SECTION C-C.
5. DRILL #30 HOLES ( $\varnothing 0.128$  REF) TO LINE UP WITH  $\varnothing 0.128$  HOLES IN D2910/D2911/D2912 DOUBLERS. C'SINK  $\varnothing 0.239 \times 100^\circ$ .
6. BOND D2905 WEB INTO D2904-1 (OR D2904-2) OUTER TUBE WITH NON-STRUCTURAL SIKAFLEX-241/291 ADHESIVE PER DART QSI 015. ENSURE HOLES LINE-UP.
7. WELDING TO BE DONE PER DART QSI 004.
8. AFTER DRILLING, BENDING, AND INSTALLING WEB & DOUBLERS, PERFORM THE FOLLOWING FOR  $\varnothing 0.500$  HOLES ONLY:
  - CHAMFER HOLE  $0.050 \times 45^\circ$
  - INSERT D2909 SPACER (11 PLACES)
  - WELD INTO PLACE
  - GRIND FLUSH
  - DRILL OUT SPACER TO  $\varnothing 0.406$
9. FINAL CONFIGURATION SHOULD HAVE THE FOLLOWING MINIMUM MECHANICAL PROPERTIES:
  - MINIMUM YIELD TENSILE STRENGTH = 35 ksi
  - MINIMUM ULTIMATE TENSILE STRENGTH = 38 ksi
10. FINISH:
  - ACID ETCH, ALODINE ASSEMBLY PER DART QSI 005 4.1 PRIOR TO INSTALLING D2905 WEB AND D2910/D2911/D2912 DOUBLERS.
  - POWDER COAT WHITE (REF. 4.3.5.1) PER DART QSI 005 4.3
  - BLACK ANTI-SKID PAINT AS INDICATED TO 1.0 ABOVE SKIDTUBE CENTER-LINE PER DART 005 4.4 (OPTIONAL).
11. DRILL  $\varnothing 0.297$  FOR ALS7-1032-130 INSERT USING DT8395 BEFORE FINISH. INSTALL ALS7-1032-130 INSERTS AFTER FINISH.

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NO. 1820  
WORK ORDER  
SUBJECT TO AMENDMENT  
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MS27039-1-08 SCREW (1)  
AN960JD10L WASHER (1)  
(50 PLACES)

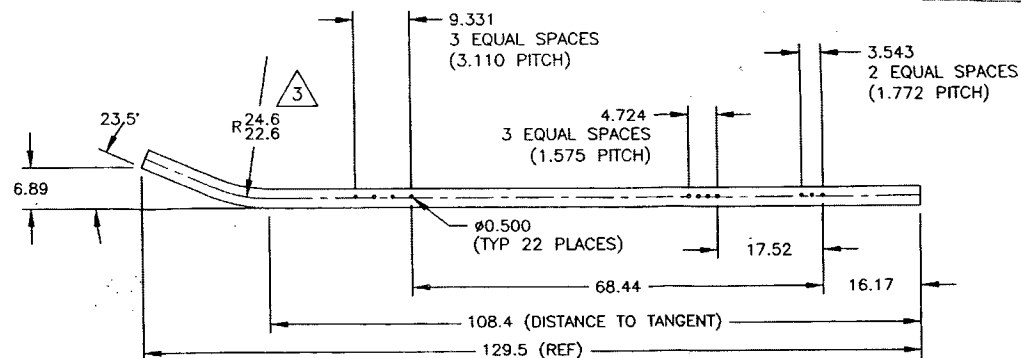
WEARSHOE/WEARPAD (REF)

ALS7-1032-130 INSERT  
(50 PLACES)

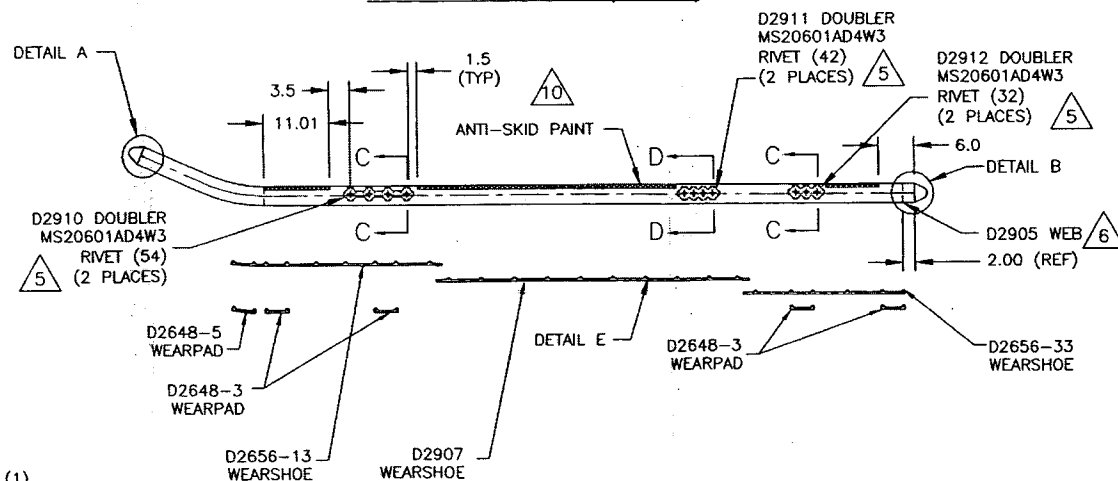
11

D2904-1 BENDING/DRILLING DETAIL (SHOWN)  
D2904-2 BENDING/DRILLING DETAIL (OPPOSITE)

2



D2904-041 LH ASSEMBLY DETAIL (SHOWN)  
D2904-042 RH ASSEMBLY (OPPOSITE)



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DATE

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APPROVED

**DART** DART AEROSPACE USA, INC.  
BELLVILLE, WA

DRAWING NO.  
D2904

REV. B  
SHEET 3 OF 3

TITLE  
SA 315B SKIDTUBE ASSEMBLY

SCALE  
1:20





NO. 108

AWS D17.1.2001  
QUALIFICATION TEST RECORD

Name Barclay Elliott  
Joint Welding Procedure Tig  
Part number and Job number A 315063012 / B 31821

TEST WELDS REQUIRED

BASE METAL Alum WELDING PROCESS Tig  
Penetration Complete ☐ Partial ☒ Single Weld ☒ Double Weld ☐  
Current AC ☒ DC ☐ Backing YES ☐ NO ☒

	Position	Vertical	Down <input type="checkbox"/>	Up <input type="checkbox"/>
Sheet Groove	1G <input type="checkbox"/>	2G <input checked="" type="checkbox"/>	3G <input type="checkbox"/>	4G <input type="checkbox"/>
Tube Groove	1G <input type="checkbox"/>	2G <input checked="" type="checkbox"/>	5G <input type="checkbox"/>	6G <input type="checkbox"/>
Sheet Fillet	1F <input type="checkbox"/>	2F <input checked="" type="checkbox"/>	3F <input type="checkbox"/>	4F <input type="checkbox"/>
Tube Fillet	1F <input type="checkbox"/>	2F <input checked="" type="checkbox"/>	4F <input type="checkbox"/>	5F <input type="checkbox"/>

Crossbolt Spacer Welded into Skidtube

TEST RESULTS

Visual Pass ☒ Fail ☐  
Penetration Pass ☒ Fail ☐  
Crossbolt Spacer Pass ☒ Fail ☐

The above named individual is qualified in accordance with AWS D17.1.2001 to weld

Date of Test Coupon 07/05/08 Qualifier Sawd Rude